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Hunter Survey

Phase II: Final Report

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Garrison-Taft 500 kV Transmission Project

Phase II Hunter Survey Final Report

SUBMITTED TO

Montana Department of Natural Resources and Conservation
Contract No. FS-SAJM-115

BY

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April, 1988

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INTRODUCTION

This report presents the results of the Phase II survey of hunters conducted to assess the impacts of Bonneville Power Administration's 500-kV transmission line on elk hunting opportunities in western Montana.

The survey is the second in a series of three; a baseline study was conducted in 1983 before the line was constructed and a mail survey will be conducted in 1987.

The three surveys form the social component of the Elk Monitoring and Mitigation Project being conducted by several state and federal agencies. A report prepared by the Montana Department of Fish, Wildlife and Parks contains background information on the transmission line and entire monitoring effort, a description of the two primary study areas, and progress on the biological component of the study (Thompson & Dickson, 1987).

The Phase II hunter survey was conducted during Fall, 1986. The survey methodology, including questionnaire, check station location, and interview procedure, was very similar to that of the Phase I baseline study (see Allen, 1984 for the methods and results of that study). The names and addresses of hunters surveyed during Phase II will be the sample for the Phase III mail survey.

The primary goal of the Phase I study was to obtain baseline information on hunters who used the two study areas (The Harvey-Eightmile area, or eastern, study area; and the DeBorgia, or western, study area).

Hunters at seven check stations were given a questionnaire asking about various aspects of their hunting. They provided information on where they hunted, what game they killed or saw, why they chose the study area as a place to hunt, how they evaluated hunting quality and road density in the study areas, and past experience hunting in the study areas.

These particular questions were chosen because they all related to aspects of the hunting experience that could be affected by the line. For example, hunters who chose to hunt in a natural, roadless area could view the line and its new or upgraded access roads as an intrusion. Hunters who preferred to see more road access, however, could benefit from the line; the corridor itself, a new type of access, could attract hunters.

The study design also included a control group of hunters who had not hunted in one of the study areas on that trip (the experimental group was people who had hunted inside the study areas that trip). The independent variable was the transmission line and the dependent variable was hunting opportunity, defined as the type and quality of experience hunters were seeking in the study areas.

A control group was needed because hunting behavior varies from season to season based on the weather, access, perceptions of game populations, information from friends, time available, and a host of other influences. This variation should be similar in both the experimental and control groups. If it is--but other characteristics of the two groups differ--then those changes could be more attributable to the transmission line.

The baseline study concluded that a majority of the hunters, about 57 percent, could be significantly affected by the transmission line and its associated roads.

It was hypothesized that different types of hunters were likely to be affected somewhat differently by the line. People hunt and choose hunting locations for a variety of reasons, so there is no "average" hunter. A cluster analysis divided the sample into seven hunter "types," based on the importance of seven reasons for hunting in the study areas. This avoided the common problem in such research of averaging the entire sample's results, thereby losing much individual variation.

People who wanted to hunt near their homes, to enjoy nature, avoid other hunters, and hunt away from roads were hypothesized to be the hunters most negatively affected by the line. These people were more likely to say they were hunting in their favorite place to hunt elk in western Montana. On the other hand, hunters who favored more road access were expected to benefit from the line. Some hunters were expected to be attracted to the study areas specifically because the line and roads opened up more country, even if the roads were gated.

RESEARCH QUESTIONS

The goal of the Phase II study was to test the baseline study's hypotheses about the type and level of the transmission line's potential impacts. These questions, listed below, will be answered in the Conclusions section:

1. Has hunters' use of the study areas increased or decreased since the line was built?

This asks about the line's effects on the amount of use in the study areas as measured by the car counters at each check station. Any use level changes must be interpreted cautiously because we don't have long-term traffic data for the check stations.

2. Has the type of hunting use (as measured by reasons for choosing hunting locations) changed in the study areas since the line was built?

This is a critical issue regardless of whether use increased or decreased because it identifies who has been affected, and how. Hunters were not expected to respond uniformly to the line because they chose the study areas for different reasons which had varying degrees of sensitivity to the line's effects. The issue is whether hunters now using the study areas are looking for the same experiences as were hunters who used the study areas before the line was built.

Hunters seeking certain types of experiences may have stopped using the areas, perhaps replaced by hunters seeking experiences enhanced by the line. This phenomenon is called visitor succession and displacement. The terms are similar to their biological counterparts; if a recreation setting is changed (such as by a transmission line), then the types of hunting experiences that area facilitates can change, too. If hunters don't like the changes, they may leave the area, but new hunters who favor the changes may move into the area. The impact would be positive for one type of hunter and negative for the other.

> 3. Has the quality of hunting changed, as measured by the percentage of hunters who said they were hunting in their favorite or one of their favorite areas?

People who said in 1983 that they were hunting in a prized area were hypothesized to be affected adversely by the line because they may have few or no other substitute locations to visit if they don't like the line in their "home range."

Hunters who said the study area was only one of many places they hunt would presumably have more places to go for similar experiences, lessening the significance of any impacts identified. The Phase III study will include several questions on substitutability.

4. Have kill rates, especially of spike bulls, increased in the study areas?

DFWP analyses were based on study of hunting trends in the two hunting districts where the study areas are located--not from data specific to the elk monitoring study. The hunter survey will compare current to previous rates in the study areas, although the lack of more baseline data may limit interpretations.

5. Did hunters who were hypothesized to be the most adversely affected leave the study areas?

Three of the hunter types identified during Phase I were hypothesized to be the most vulnerable to impacts. If the impacts were viewed as severe, they may have quit using the study areas. If these three types of hunters do not appear to be using the study areas, then this impact may have occurred.

6. What are hunters' attitudes toward access roads and road closures?

Access roads and their management could play a key role in the line's effects on hunting opportunities. The DFWP report questioned the effectiveness of road closures, citing many violations of public road closure. The new roads are there; how do hunters want to see them managed?

RESULTS

Before addressing each of the six questions, this section provides an overview of the survey results. First is a review of data for the entire sample, with the results compared to those from 1983. If the results differ significantly between the eastern (Harvey-Eightmile) and western (DeBorgia) study areas, they are discussed separately.

Completed questionnaires were collected from 715 hunters, slightly more than the 664 interviewed during Phase I. The rate of response was high again--96 percent. Table 1 shows how many hunters were interviewed at each check station in each Phase. The specific dates check stations were manned were not coded.

The sample size was close to that of 1983 except more hunters were interviewed at the Harvey Creek and Middle Fk. Rock Cr. check stations in 1986. The sample shared many characteristics with the 1983 sample, consistency that was expected when surveying in areas that hunters return to frequently. Nearly all of the hunters (91 percent) were men, hunting in small groups: 21 percent hunting alone; 50 percent with one other; and 20 percent with two other hunters. Nearly all (93 percent) were hunting for elk.

Eighty-eight percent lived in Montana and 43 percent of the residents were from Missoula. Their average age was 37 and they had been hunting big game in Montana for nearly half that (14 years). The check stations efficiently sampled study area users;

83 percent of the sample hunted inside or within one mile of the study areas.

One-quarter of the sample said they had participated in the survey before--presumably most in the 1983 study. However, some hunters could have been interviewed at another check station in 1986.

About half of the hunters said they hunted for one day on this trip, while 27 percent had hunted 1/2 day and seven percent two days. The median number of days hunted was 1.0 and the mean was 1.44 days.

The hunters interviewed took about 1,030 hunter-days to kill 32 elk and 58 deer, or about 32 days per elk. This is lower than the 1983 average of 45 days. Twenty-seven percent of the elk killed were branch-antlered bulls, 41 percent were spike bulls, and 31 percent cows or calves. Eighty percent of the hunters interviewed didn't see an elk on that trip.

Although hunters in the western study area comprised 61 percent of the sample, they killed 77 percent of the elk, including seven of the eight branch-antlered and 10 of the 12 spike bulls. They also tended to see more elk.

TABLE 1. Number of Questionnaires Completed at Each Check Station

Check Station	Completed in 1986	Completed in 1983
Harvey Creek	44	24
Beavertail	237	227
Cabin City	115	113
Middle Fk. Rock Cr.	102	70
DeBorgia	48	46
Haugen	93	106
Saltese	76	78
TOTAL:	715	664

Of the deer harvested, 61 percent were two-point or better bucks, 15 percent spikes, and 24 percent does or fawns. Eastern study area hunters killed 85 percent of the mule deer and 56 percent of the white-tails. This parallels the 1983 finding that more people were hunting specifically for elk in the western study area and for deer in the eastern area.

Twenty-one percent were hunting in the area for the first time, compared to 33 percent of those interviewed in 1983; seven percent were returning for the second year, 13 percent for the third, and 10 percent for the fourth. The median number was five.

Fifteen percent said they were hunting in their favorite area and 26 percent said it was one of their favorite hunting locations in western Montana. Another 45 percent said the place interviewed was one of many places they hunt, and 10 percent said they prefer to hunt elsewhere. These numbers are nearly identical to the 1983 sample's responses.

More western than eastern study areas hunters said they were hunting in their favorite area ($t = 4.43$, $p < .01$). Only seven percent of the eastern area hunters said they were in their favorite hunting location, compared to 20 percent of those surveyed in the western study area. This is consistent with the finding that western hunters had been hunting there for more years, and hunted there more days per year.

As in 1983, the questionnaire contained a list of reasons for choosing the specific hunting area where they were interviewed. The results (Table 2) closely paralleled the 1983 findings; the most important reasons listed were enjoying nature, getting meat, and hunting where there weren't many other hunters.

The eastern and western study area hunters differed slightly on two of the nine items, with western area hunters rating avoiding other hunters as more important ($t = 2.83$, $p < .01$) and enjoying scenery as more important ($t = 2.58$, $p < .01$).

Appendix D contains the results of a cluster analysis of the seven items that also appeared on the 1983 questionnaire. These results suggested that people hunted in the study areas for similar reasons both years, although this was not conclusive.

Table 2. Hunters' Ratings of the Importance of Reasons for Hunting in the Area (in percent; n=668; numbers in parentheses are percentages from the 1983 survey).

Reason	Extremely Important	Very Important	Moderately Important	Slightly Important	Not at All Important
To enjoy nature	33 (33)	37 (34)	23 (23)	4 (7)	2 (3)
To put some meat in the freezer	31 (30)	28 (23)	30 (31)	8 (12)	3 (4)
To hunt in a remore area with limited road access	18 (20)	22 (20)	34 (31)	11 (13)	14 (16)
To get a trophy	11 (8)	11 (9)	29 (28)	20 (21)	29 (34)
Because I (or others I know) have hunted here	16 (12)	21 (21)	29 (28)	22 (11)	26 (23)
Because I live near here	14 (15)	17 (17)	26 (21)	12 (15)	32 (32)
To hunt in an area where there are few other hunters	24 (28)	29 (26)	27 (25)	9 (10)	11 (10)
To hunt in an area where there are many back roads I can use*	9	16	31	20	25
To hunt in an area where I can enjoy the scenery*	26	30	28	10	6

*These questions were not on the 1983 questionnaire.

When asked about their plans to hunt in the area, over three-quarters (77 percent) of those who'd hunted in the area two years or less said they'd hunt it about as frequently. If they said their use would likely increase or decrease, they were asked why. The most common reason given was "more game." Five people said they would hunt less because of the transmission line. A wide variety of other reasons was given by one or two hunters.

People who had hunted the area more than two years were asked if their use levels had changed during that time. This group was more likely to have hunted in the study areas before the line was constructed, so their perceptions of impacts were especially valuable. Of course, hunters who stopped using the areas the season after the line was built (1985) would not have been there to be interviewed in 1986.

Thirty-eight percent of the hunters surveyed said their use of the area had changed in the past two years, while 60 percent said it had not. When asked why their use changed, hunters had a variety of responses, including references to the transmission line.

The line was listed as a positive effect by 21 percent and as a negative effect by only three percent of the people who said their use had changed. The positive effect of the transmission line was the most-frequently cited reason for change.

The reasons for liking the line were diverse, from making it harder to get lost and improving the hunting to keeping environmental purists out of the area. In the western study area, ten hunters who had hunted outside the study area listed the line as a favorable reason why their use had changed.

Here is a complete list of hunters' comments regarding the line, including responses made to other questions (comments are verbatim from interviewers' notes):

> Powerline has negatively affected hunting
>
> Powerline roads have brought more people into the area
>
> The Powerline ruined the hunting for a couple of years, but hunting seems to be getting better now
>
> Powerline makes it easier not to get lost
>
> Do not like those ugly powerlines
>
> Further development would be detrimental to wildlife
>
> Powerline has detrimental effect on hunting
>
> I don't like the powerlines; the sawyers left a lot of slash
>
> Powerline is ugly

Since powerline went in, more hunters and less game

Worked on the powerline; don't think that the powerline affected elk populations

Don't like the powerline

Powerlines are good for hunting

Powerline roads should be gated

Line construction changed area; less elk

Line construction has changed area; animals have moved

BPA powerline has moved elk out

Changed hunting location due to powerline

Saw lots of elk tracks under the powerline

More access due to powerline roads

Less elk due to access roads

Open powerlines roads to get wood, close for hunting

Elk moved out of where powerlines roads are

I think powerline will have adverse effect on elk

Most of the animals were under the powerline

Powerlines have had effect--less elk

Hunters ride motorcycles on powerline road

Powerlines open up country; not good

Powerlines affected hunting quality

Powerlines have had effect because of access; many motorcycles, three-wheelers, and horses on road

Powerlines have affected hunting

Powerline had bad effect on elk from St. Regis to Packer Creek

If more powerlines are installed, won't return

Maybe powerline keeps environmental purists out of area

After powerline went through, ruined hunting; will find another area

Open powerline road for recovering game only

There is impact from the powerlines

Powerlines are not good for hunting

Wish powerlines were not here

I never thought powerlines would come through here; I don't like them

Believe that powerlines and more logging roads have hurt game numbers; won't come back because of powerline

Easier access because of powerline

Powerline affected elk hunting

Hunters' other reasons for changing use levels included "Less game," listed by 14 percent, "Too many hunters," listed by 13 percent, "Too many road closures," listed by 10 percent, and "Too many roads," listed by nine percent. These results demonstrated that some hunters used a study area less frequently for the same reasons others used it more.

A key consideration in interpreting this information is whether hunters' use of the study areas changed more frequently than hunters' use of other areas in the region. The results showed that hunting use in the study areas changed more than use in nearby hunting areas. In the western area, 44 percent of the study area hunters said their use had changed, compared to 26 percent of those who hunted outside the study areas on the trip interviewed (chi square = 8.7, p = .01). In the eastern study area, 41 percent of the study area hunters said their use of the area had changed in the past two years, compared to 31 percent of the non-study area hunters. However, this result was not statistically significant. The Phase III study will examine more closely the role of the line in attracting or discouraging hunters' use of the study areas.

The last question on the survey form asked hunters to write any additional comments about hunting in the area. The answers were revealing because hunters likely took the time to write only about issues that were very important to them. Appendix C contains a complete list of all 200 responses, organized by check station.

As expected, hunters mentioned a variety of topics, such as clearcutting, road closures, hunting regulations, hunting quality, the abundance or lack of game, non-resident hunters, and the transmission line.

Many of the comments portrayed a fairly consistent view of hunter's concerns in a given area. For example, Beavertail hunters' comments centered on perceptions of excessive road access and clearcutting.

About 13 percent of the comments specifically mentioned the transmission line. Of these 27 comments, 22 were negative, most deploring the new roads or effects on game populations. The four positive comments all favored opening the access roads.

At first, this seems inconsistent with the earlier finding that hunters who said their use of the area had changed in the past two years tended to perceive the line's effects as positive.

One explanation is that hunters who didn't approve of the line and new roads did continue to hunt in the area. However, these hunters may have enjoyed hunting there less in 1986 than they did before the line was built, a hypothesis to be tested in Phase III of the study.

CONCLUSIONS

This section draws on the data discussed above and some additional analyses to offer preliminary answers to the six questions posed earlier. Final conclusions must wait until the Phase III mail survey data are available.

1. Has hunter use of the study areas increased or decreased since the line was built?

Table 3 shows the number of hunters measured at each car counter in 1983 - 1987. These estimates were developed by reading the car counters, subtracting non-hunters, multiplying by number of hunters per car, and dividing by two because vehicles were counted both coming and going.

At Beavertail, the number of hunters stayed about the same in 1984, then dropped in subsequent years, a pattern also found at Saltese. At Cabin City, where fewer hunters interviewed were hunting the study areas, the use levels were roughly equal throughout the period. At Middle Fk. Rock Cr., levels of use rose in 1984, then dropped closer to the 1983 levels. At Haugen, use levels dropped in 1984, then slowly rose in 1985 and 1986 and rose more rapidly in 1987.

It is difficult to attribute changes in use levels to the line. For example, DFWP statewide harvest survey data found that from 1980 to 1984, use of Hunting District 210 (where the eastern study area is located) increased two years and decreased three, with a difference of up to 43 percent (Thompson & Sterling 1986). Phase III will obtain estimates of yearly variation that are specific to the study areas.

Table 3. Car Counter Measures of Hunters, by Check Station[1]

Check Station	1983	1984	1985	1986	1987
Beavertail	1533	1588	1236	860	1218
Harvey[2]	122	----	----	---	----
Cabin City[3]	967	1190	1095	916	1438
Middle Fk. Rock Cr.	834	1252	945	729	779
DeBorgia[2]	397	----	---	198	---
Haugen	972	670	757	856	1268
Saltese	1127	1768	719	849	1023
Totals:	5952	4700	4752	4408	5952

1. Totals are from car counters estimates of number of cars, corrected for non-hunter cars, hunters per car, and return traffic (same adjustments as were made in 1983; see Phase I report for details).

2. Car counter was not operated in some years, so totals will be misleading.

3. 1987 estimate was inflated due to logging activity.

2. Has the type of hunting use (as measured by reasons for choosing hunting locations) changed in the study areas since the line was built?

Hunters' reasons for choosing to hunt in the study areas were nearly identical in 1986 and 1983, suggesting that reasons for hunting in the study areas did not change. An alternative explanation is that hunters rated the reasons based on why they hunt in general, instead of why they chose a specific area in which to hunt. In that case, the ratings wouldn't be expected to vary greatly from year to year. People hunted for similar reasons both inside and outside the study areas, which supports this interpretation.

Data from the Montana Bioeconomics study tested this variability across a wide range of hunting locations in Montana.

3. Has the quality of hunting changed, as measured by the percentage of hunters who said they were hunting in their favorite or one of their favorite areas?

As discussed above, roughly the same proportion of hunters said they were in their favorite hunting location each year. However, people who hunted outside the study areas rated those areas as more favorable than did people hunting in the study areas ($t = 4.16$, $p < .01$). For example, 20 percent of the control group said they were hunting in their favorite area, compared to 13 percent of the experimental group. Thirteen percent of those in the experimental group said they preferred to hunt elsewhere, compared to only three percent of the control group.

In 1983, 16 percent of the control group said they were hunting in their favorite area, as did 16 percent of the experimental group; no significant differences were found (and none expected because the line was not built).

These results echoed the finding that some hunters who used the study areas viewed the line's effects (especially the access roads) as negative but continued hunting there. Because no questions specific to the line were asked, this issue will not be addressed until Phase III is completed.

Another way to address this question is to see if people who hunted the study areas before the line was built responded differently from those who just hunted the study areas after the line was constructed.

This difference was there; 29 percent of the line-only hunters said the study area was their favorite or one of their favorite places to hunt, compared to 53 percent of those who had hunted the study area more than three years. Fewer of the hunters relatively new to the area preferred it to other hunting locations, compared to the long-term hunters.

This difference seemed to be based more on length of use, however, than on any impact related to the line; the corresponding numbers for the 1983 survey were nearly identical.

4. Have kill rates increased, especially of spike bulls?

Harvest rates did not appear to increase in the eastern study area, although they may have in the western area, where the number of spikes killed rose from three in 1983 to 10 in 1986. This difference cannot be attributed to the line, however, without analysis of long-term hunting trends in the study area.

5. Did hunters who were hypothesized to be the most adversely affected leave the study areas after the line was built?

Hunters who've hunted in the study areas for a long time may have quit using them since the line was built. If this happened, we could expect to see an aggregate decrease in the average number of years people had been hunting the study areas.

In 1983, respondents said they had been hunting in the study areas for an average of six years. This was close to the level reported by non-study area hunters (the control group). In 1986, the average for study area hunters was just over eight years, for both study area and non-study area hunters.

This is about the difference that would be expected if the same population kept using the same areas from year to year. These results suggest that a large percentage of long-time users continued to use the study areas after the line was built. The percentage that may have left, or who use the study areas less frequently, will be estimated after the Phase III survey.

The question is complex because many hunters who live near the study areas and have hunted there many years may have continued to hunt there even if they didn't favor the setting changes caused by the line. They could simply hunt within the study area but avoid the line. Questions specific to the line will be included on the Phase III mail survey to explore these impacts in more detail.

6. What are hunters' attitudes toward access roads and road closures?

As predicted, some hunters appreciated the new roads, while some viewed them as negative; the same was true of attitudes toward road closures. About twice as many hunters said there were too many roads and too few closures as said they favored fewer closures and more roads.

Table 4 shows that the numbers were comparable to the percentages found in 1983, but this does not mean that no impact has occurred; about one-quarter of the sample said there were too many roads in the area where they hunted.

Table 4. Hunters' Attitudes Toward Number of Roads and Road Closures (in percent; 1983 percentages in parentheses).

For hunting purposes, the number of roads in this area is:

Too Few	11 (11)
About Right	65 (62)
Too Many	24 (27)

For hunting purposes, the number of road closures in this area is:

Too Few	16
About Right	57
Too Many	27

Not surprisingly, over half of the hunters who wanted fewer roads also wanted more closures, while 83 percent of the hunters who favored more roads also wanted fewer closures. Road management thus becomes a zero-sum proposition; closing roads was favored by one group of hunters and opposed by another.

Short-term hunters (the 40 percent of the sample who used the study areas less than three years, and hence only since the line was built) and long-term hunters (the other 60 percent of the sample) expressed opposing positions on road access. However, the majority of both agreed that the number of roads and closures was "about right."

Nearly twice as many hunters who'd been using the study areas more than three years said there were too many roads in the area. Similarly, 21 percent of the long-term hunters said more roads should be closed in the study areas, compared to only nine percent of the short-term users. However, equal percentages of both groups (about 26 percent) said that too many roads were closed in the areas they hunted.

The Phase III survey will explore attitudes toward and use of roads (and road closures) in more detail, as well as assess the extent and nature of substitute areas for each type of hunting experience. More importantly, the survey will go beyond Phase II to ask directly about the line and its perceived effects on hunting quality, as well as ask how hunters' behaviors may have been changed by the line.

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Allen, Stewart Hunter Survey Phase I Baseline Study: Final Report. Paper submitted to Montana Department of Natural Resources & Conservation and Bonneville Power Administration, November, 1984.

Thompson, Michael J. and David C. Dickson Impact Mitigation and Monitoring of the BPA 500 KV Transmission Line--Effects on Elk Security and Hunter Opportunity. Annual progress report prepared by Montana Department of Fish, Wildlife & Parks, January, 1987.

APPENDIX A

Questionnaire and Coding Manual

OMB Approval #1910-1200
Expires 3/31/87

MONTANA HUNTER SURVEY

1. We'd like to know why you are hunting here today. Please check the box showing how important each of the following reasons was in your decision to hunt in this area (the area you outlined on the map). Check one box for each item.

	I am hunting here:	Extremely Important	Very Important	Moderately Important	Slightly Important	Not at all Important
A.	TO ENJOY NATURE	☐	☐	☐	☐	☐
B.	TO PUT SOME MEAT IN THE FREEZER	☐	☐	☐	☐	☐
C.	TO HUNT IN A REMOTE AREA WHERE ROAD ACCESS IS LIMITED	☐	☐	☐	☐	☐
D.	TO GET A TROPHY ANIMAL	☐	☐	☐	☐	☐
E.	BECAUSE I (OR OTHERS I KNOW) HAVE HUNTED HERE BEFORE	☐	☐	☐	☐	☐
F.	BECAUSE I LIVE NEAR HERE	☐	☐	☐	☐	☐
G.	TO HUNT IN AN AREA WHERE THERE ARE FEW OTHER HUNTERS	☐	☐	☐	☐	☐
H.	TO HUNT IN AN AREA WHERE THERE ARE MANY BACK ROADS I CAN USE	☐	☐	☐	☐	☐
I.	TO HUNT IN AN AREA WHERE I ENJOY THE SCENERY	☐	☐	☐	☐	☐

In the next questions, THIS AREA refers to the area you indicated on the map. Ask the interviewer if you have questions.

2. How do you feel about hunting in THIS AREA? (Please check one box only)

☐ It's my favorite place to hunt in western Montana.

☐ It's one of my favorite places to hunt in western Montana.

☐ It's just one of many places where I hunt in western Montana.

☐ There are other places in western Montana where I prefer to hunt.

3. For hunting purposes, do you feel that the number of roads in THIS AREA is too few, about right, or too many? (Check one)

☐ Too few

☐ About right

☐ Too many

4. For hunting purposes, do you feel the number of road closures (gated roads) is too few, about right, or too many? (Check one)

☐ Too few; more roads should be closed

☐ About right

☐ Too many; more roads should be open

5. Could you please tell us where you live? ______________________ City or town ____________ State

6. Finally, could you please tell us your age? _____ years old.

If you have any comments about the hunting in this area or related issues, please write them here. Thank you!

Note: This is a special survey, and is not the same as the annual telephone survey conducted in January by the Department of Fish, Wildlife, and Parks. If they should happen to call you, please help them out, too!

Check station:_________ Questionnaire #:_________ Interviewer:_________ Date:_________ Time:_________ am pm

Sky cover:

☐ Clear
☐ <50% cloudy
☐ >50% cloudy
☐ Raining
☐ Snowing

Ground cover:

☐ Dry
☐ Wet
☐ Patchy snow
☐ Snow cover

Temperature

☐ Warm ($>50^{\circ}$)
☐ Cool ($20-50^{\circ}$)
☐ Cold ($<20^{\circ}$)

Sex of respondent:

☐ Male
☐ Female

Number in party:

____ Men
____ Women

Status:

☐ Hunter didn't stop
☐ Other didn't stop
☐ Hunter stopped, no q.
☐ Hunter stopped, q. completed
☐ Repeat hunter

---

	2. Check if kill made	3. Type killed
1. What are you hunting for this trip: ☐ Elk (permit?___)	☐	_________
☐ Mule deer	☐	_________
☐ Whitetail deer	☐	_________
☐ Other:_________	☐	_________
☐ Other:_________	☐	_________

4. (If Elk was killed) Was this the type of Elk you had wanted to get?

☐ Yes
☐ No; preference was for __________
☐ Shot first Elk seen
☐ Had cow permit
☐ Other:____________________

5. About how many Elk did you see in this area? _____ Elk (ask to everyone)

6. Could you show me where you spent most of your time hunting on this trip? (Hand map)

A. Have hunter draw on map overlay; probe if necessary.
B. If stay was overnight, try to determine campsites; mark with dot(s).
C. If Elk was killed, mark location with X on map.
D. If hunter was in or near study area, show topo map to pinpoint locations.
E. Transfer information to xeroxed map, erase overlay, write questionnaire # on map.

7. How long did you hunt in this area on this trip? _____ Days

8. How many years have you hunted in this area? _____ Years ☐ First visit to area

9. (If respondent has hunted here before) About how many times a year do you hunt in this area?

_____ Times a year

10. (If respondent has hunted this area for two years or less)

Do you plan to keep hunting this area about this much in the future?

☐ Yes ☐ No ☐ Not sure

(If yes or no) 11. Why?______________________________

12. (If respondent has hunted in area for more than two years)

Has your use of this area changed over the past two years?

☐ Yes ☐ No

13. If yes, How? ____________________________

14. How many years have you hunted big game in Montana? _____ Years

15. Did you complete this questionnaire last year or the year before? ☐ Yes ☐ No

---

Could you please answer a few more questions? (Hand questionnaire, clipboard, pen to hunter)

NOTES:

GARRISON-SPOKANE 500 kV TRANSMISSION PROJECT

PHASE II HUNTER SURVEY CODING MANUAL, 1986

Var #	Q #	Var Label	Column	Value	Value Label
1	1	Check Station	1	1	Harvey Creek
				2	Beavertail
				3	Cabin City
				4	Middle Rock
				5	DeBorgia
				6	Haugen
				7	Saltese
2	2	Q. Number	2 - 4		As needed
3	3	Interviewer	5		As needed
4	4	Month	6	1	October
				2	November
5	4	Date	7 - 8		As needed
6	5	Time	9	1	8 - 12 noon
				2	noon - 4 pm
				3	4 - 8 pm
7	6	Sky cover	10	1	Clear
				2	<50 % cloudy
				3	>50 % cloudy
				4	Raining
				5	Snowing
8	7	Ground cover	11	1	Dry
				2	Wet
				3	Patchy snow
				4	Snow cover
9	8	Temperature	12	1	Warm (over 50)
				2	Cool (20 - 50)
				3	Cold (below 20)
10	9	Respondent Sex	13	1	Male
				2	Female
11	10	# in party	14		As needed

12	11	Status	15	1	Hunter didn't stop
				2	Other didn't stop
				3	Refusal
				4	Q. completed
				5	Repeat hunter
13	12	Type(s) hunted	16	1	Elk only
				2	Elk, Mule, Wtail
				3	Elk & Mule
				4	Elk & Wtail
				5	Mule only
				6	Wtail only
				7	Mule & Wtail
				8	Elk, deer, bear
				9	Other
14	13 a	Type(s) killed	17	1	Elk only
				2	Elk, Mule, Wtail
				3	Elk & Mule
				4	Elk & Wtail
				5	Mule only
				6	Wtail only
				7	Mule & Wtail
				8	Elk, deer, bear
				9	Other
15	13 b	Elk killed	18	1	Branch bull
				2	Spike bull
				3	Cow
				4	Calf
16	13 c	Deer killed	19	1	Branch buck
				2	Spike buck
				3	Doe
				4	Fawn
17	14	Type wanted	20	1	Yes
				2	No
				3	Shot first seen
				4	Cow permit
				5	Other
18	15	Elk seen	21 - 22		As needed
19	16	Days hunted	23 - 25		As needed (one decimal)
20	17	Yrs. in area	26 - 27		As needed
21	18	Days per year	28 - 29		As needed

22	19	Future plans	30	1	Yes
				2	No
				3	Not sure
				4	Other
23	20	Future reasons	31		As needed
24	21	Use changes	32	1	Yes
				2	No
				3	Not sure
				4	Other
25	22	Change reasons	33		As needed
26	23	Years in MT	34 - 35		As needed
27	24	Survey before	36	1	Yes
				2	No
28	25	Hunt zone 1	37 - 38		As needed
29	25	Hunt zone 2	39 - 40		As needed
30	25	Hunt zone 3	41 - 42		As needed
31	25	Hunt zone 3	43 - 44		As needed
32	25	Hunt zone 4	45 - 46		As needed
33	25	Hunt zone 5	47 - 48		As needed
34	26	Camp zone 1	49 - 50		As needed
35	26	Camp zone 2	51 - 52		As needed
36	27	Kill zone 1	53 - 54		As needed
37	27	Kill zone 2	55 - 56		As needed
38	28	Map used	57	1	Topo
				2	USFS
39	29	Study area	58	1	In study area
				2	Within 1 mile
				3	Within 1 - 3 miles
				4	Over 3 miles
40	30	Road use	59	1	came in and left on same road
				2	came in and left

					on different roads
				3	not sure
41	31	Miles to line	60	1	Less than 1/2 mile
				2	1/2 - 1 mile
				3	1 - 2 miles
				4	2 - 3 miles
				5	3 - 5 miles
				6	5 or more miles
42	32	Line crossed	61	1	Yes
				2	No
43	1 a	Nature	62	1	Extremely important
				2	Very important
				3	Moderately important
				4	Slightly important
				5	Not at all important
44	1 b	Meat	63	1	Extremely important
				2	Very important
				3	Moderately important
				4	Slightly important
				5	Not at all important
45	1 c	Few roads	64	1	Extremely important
				2	Very important
				3	Moderately important
				4	Slightly important
				5	Not at all important
46	1 d	Trophy	65	1	Extremely important
				2	Very important
				3	Moderately important
				4	Slightly important
				5	Not at all important
47	1 e	Here before	66	1	Extremely important
				2	Very important
				3	Moderately important
				4	Slightly important
				5	Not at all important
48	1 f	Live near	67	1	Extremely important
				2	Very important
				3	Moderately important
				4	Slightly important
				5	Not at all important
49	1 g	Few hunters	68	1	Extremely important

				2 3 4 5	Very important Moderately important Slightly important Not at all important
50	1 h	Many roads	69	1 2 3 4 5	Extremely important Very important Moderately important Slightly important Not at all important
51	1 i	Scenery	70	1 2 3 4 5	Extremely important Very important Moderately important Slightly important Not at all important
52	2	Area rating	71	1 2 3 4	Favorite One of favorite One of many Prefer others
53	3	Road rating	72	1 2 3	Too few About right Too many
54	4	Closure rating	73	1 2 3	Too few About right Too many
55	5	City	74 - 75		As needed
56	5	State	76 - 77		As needed
57	6	Age	78 - 79		As needed
58	7	Comment 1	80 - 81		As needed
59	7	Comment 2	82 - 83		As needed
60	7	Comment 3	84 - 85		As needed

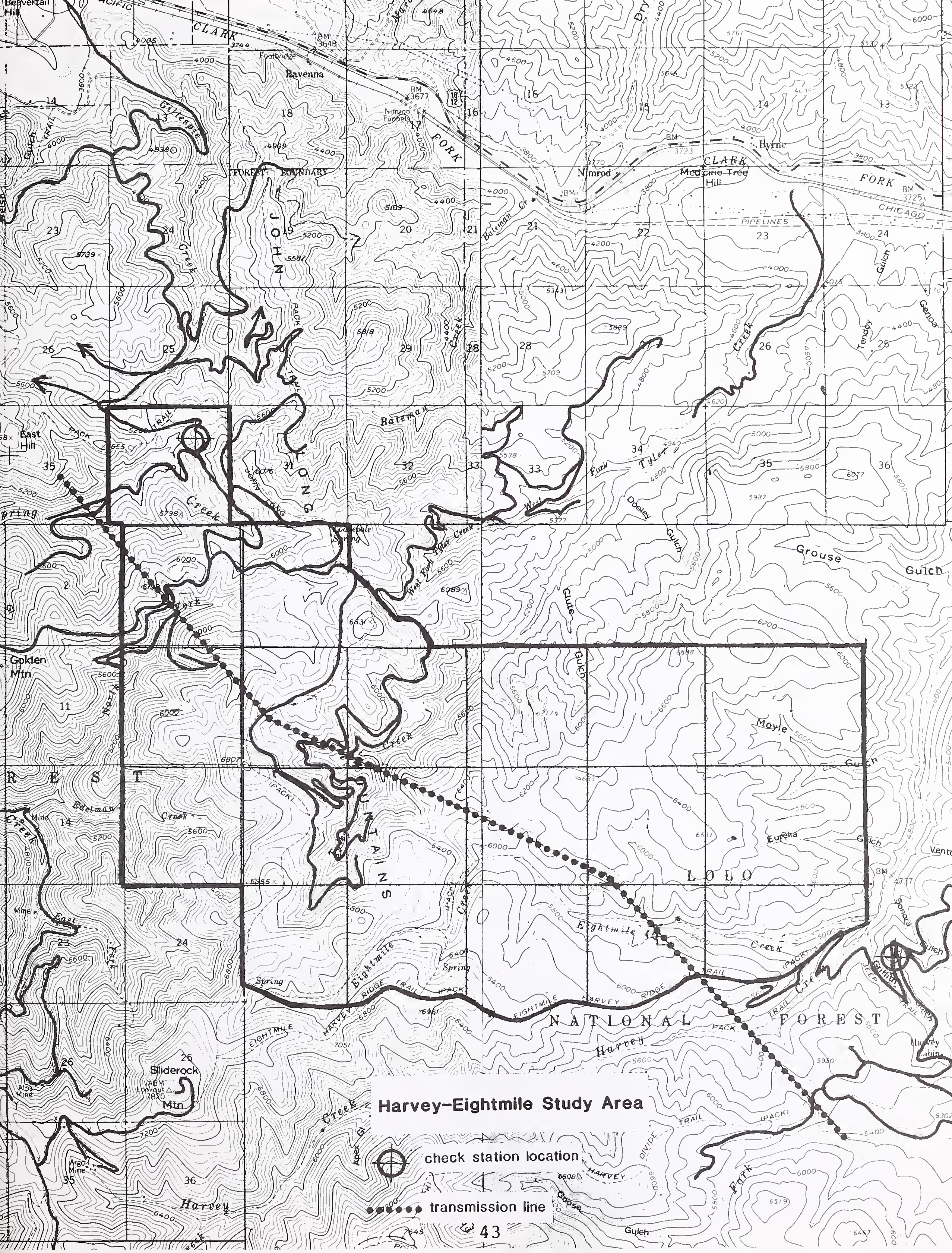
APPENDIX B

Study Area Maps and Grid Locations Where Hunting Took Place

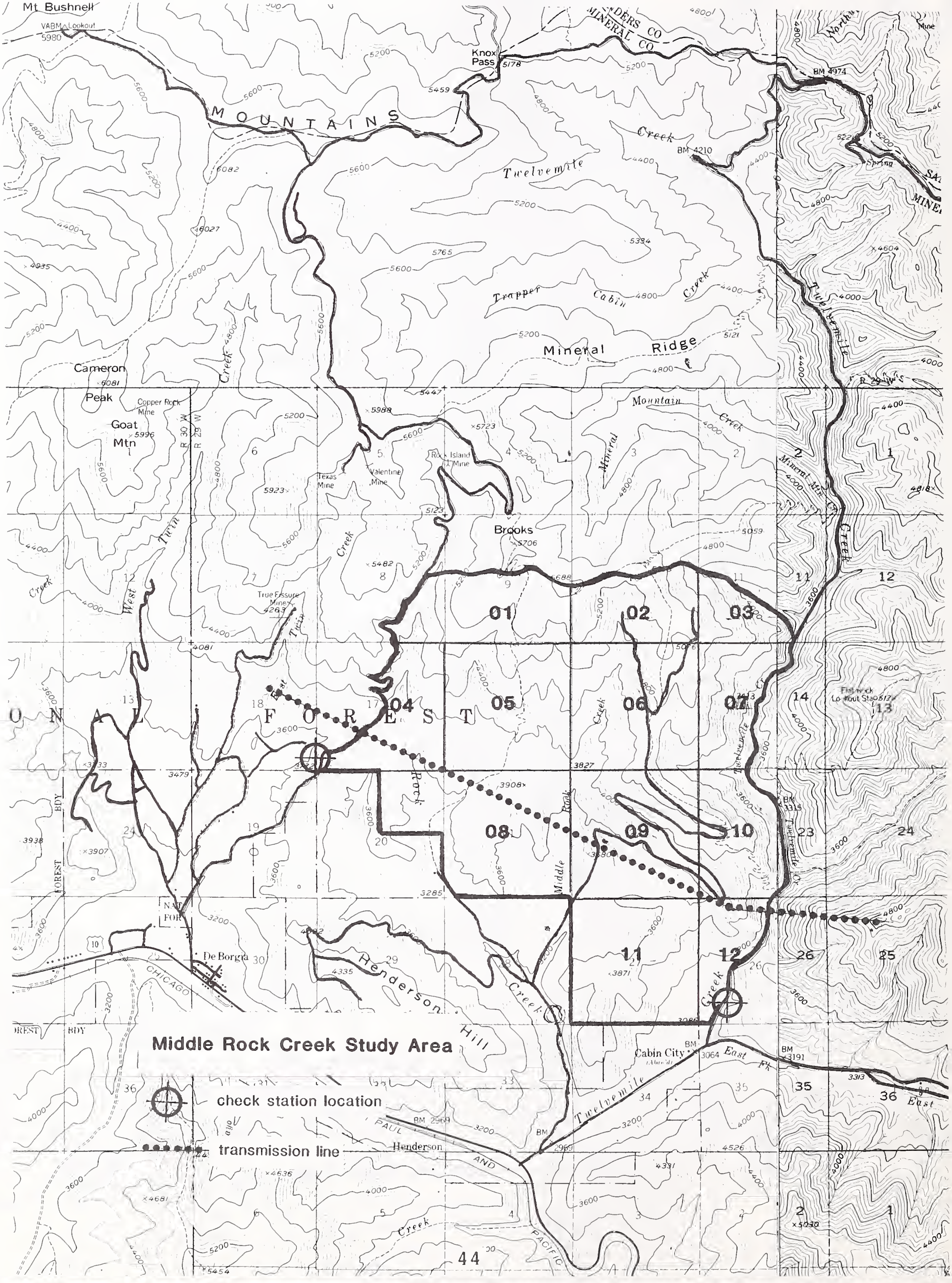
Hunting Locations by Check Station*

Grid #	Harvey	Beavertail	Cabin City	Middle Fk. Rock Creek	DeBorgia	Hauge
1	-	118	3	14	37	4
2	-	79	2	21	3	2
3	-	71	34	6	15	1
4	-	13	4	9	45	-
5	-	51	3	13	8	-
6	-	15	5	30	4	11
7	-	4	38	7	13	9
8	2	1	5	31	10	3
9	2	-	7	68	16	2
10	-	28	39	37	5	8
11	-	41	11	28	4	34
12	-	12	38	15	15	31
13	-	2	x	x	x	38
14	2	-	x	x	x	24
15	2	3	x	x	x	25
16	2	20	x	x	x	x
17	2	5	x	x	x	x
18	8	3	x	x	x	x
19	16	-	x	x	x	x
20	19	-	x	x	x	x

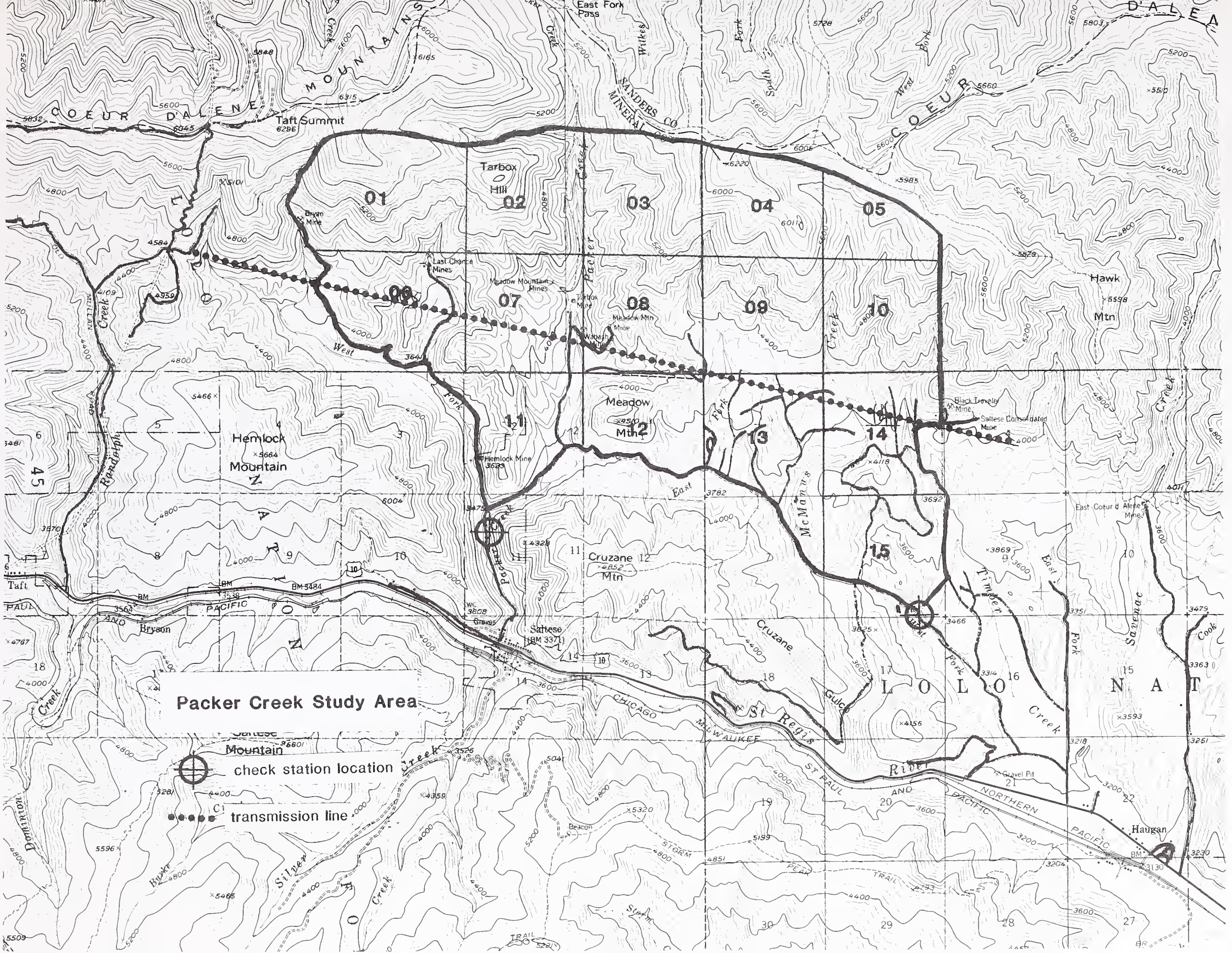
*Grid numbers are comparable only for check stations in the same
(Harvey/Beavertail, Cabin City/Middle Rock/DeBorgia, Haugen/Saltese). Number
many hunters said they hunted in that grid. A dash indicates no reported
indicates that the grid number did not exist for that study area. The check s
down the road (closer to the Interstate) in 1986 due to poor access.



Harvey-Eightmile Study Area



Middle Rock Creek Study Area


Packer Creek Study Area
check station location
transmission line
01
02
03
04
05
06
07
08
09
10
11
12
13
14
15
Tarbox Hill
Meadow Mtn
Hemlock Mountain
Cruzane Mtn
Hawk Mtn
Taft Summit
East Fork Pass
COEUR D'ALENE MOUNTAINS
SANDERS CO
MINERAL CO
Packer Creek
West Fork
East Fork
McManus Creek
Timber Creek
Savenac
Cruzane Gulch
St Regis River
Randolph Creek
Bryan Mine
Last Chance Mines
Meadow Mountain Mines
Tarbox Mine
Meadow Mtn Mine
Wabash Mine
Hemlock Mine
Black Traveler Mine
Saltese Consolidated Mine
East Coeur d'Alene Mine
Gravel Pit
Saltese
Taft
Bryson
Haugan
Saltese Mountain
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
NORTHERN PACIFIC
MULLAN ROAD
LOLO NAT
STORM PEAK TRAIL

APPENDIX C

Comments Volunteered by Hunters in Space Provided on Form

COMMENTS:

Harvey Creek:

Access to private land desirable (3)
Knowing private owners here helps
Good spot - keep as is
Increase game capacities by increasing number of scar fires for grasses and exclude cattle
Resolve private land "refuge" and hunting area controversy
List of land owners with cow permits would be helpful
Too many permits to Missoula hunters
Let bow hunters through gate, then lock before season opens
Too many permits to outfitters
Too many people (2)
Too many people given access to areas they're not familiar with
Too many out-of-staters; jeopardizes my hunting possibilities
Too many access roads
More road closures would probably improve overall hunting

Beavertail:

Too much clearcutting (3)
Clearcuts, road closures have had negative effect on elk
No more logging - good habitat now (2)
Sawyers left lots of slash
Very nice area for hunting/love to hunt (3)
Hard, steep to climb
Too many trail bikes/vehicles behind closed roads (3)
Hunting further back due to number of roads .
Close more roads/too many roads (11)
Closing roads has improved hunting (2)

Too many roads closed (3)
Open roads to spread out hunting (3)
Keep number of gates same - no more or less
Too many people (6)
More patrols for poaching
Handicapped/elderly access (2)
More deer tags
More cow elk permits (2)
Reopen cow elk
More elk permits (2)
Not enough game (3)
Branch antlered bull season in this area (2)
Lots of game
Good deer hunting; OK for elk
Too much hunting pressure
Ugly powerline
Powerlines have had detrimental effect on hunting (4)
Must go further into area since powerlines were installed (2)

Cabin City:

Too many roads - close them all year round (5)
More closure gates (4)
Need a system to pick up aminals with vehicle on closed roads (3)
Don't allow anybody behind closed gates, esp. loggers (2)
Don't allow horses in walk-in area (2)
Road closures exclude old and handicapped people
People on closed roads with cycles and snowcats
Road closures make it easier for guys with horses
Branch antlered bull season - too few bulls with big horns
Open cows to all
Less game (3)
Animals were under powerlines all this year
BPA changed habitat and moved out of lower area
Good hunting
Should not be able to get a permit for 2 years after getting a cow permit
Continue game mgmt. to insure future opportunities and success
Too many non-resident camps in area (3)
Clearcuts chase herds away
Need more burn areas
Forest mgmt. in Section 36 is disgusting (State land) (2)
Gate powerline road
Close more roads due to amt. of landscape damage, to relieve pressure on game animals, make forest more pleasant to be in
Montana should have 17,000 elk and deer tags each and sell them for $250.00 each - more money to state as well
Enjoyable (2)

Middle Rock Creek:

Senior citizens and handicapped should be allowed behind gates to allow them equal opportunity and fair chance rather than on public roads that are already overhunted
Leave gates to powerlines open so we can use roads (2)
Have more road access in selected remote areas
Too many closed roads for all-around recreation
Roads ok, but lock gates so bulls can service cows without pressure from hunters, woodcutters - access to food, water, salt
Road closures illegal - county paid for, Forest Service locked
Should be able to use snowmobiles etc. to retrieve game when roads are closed (2)
Shorter season, open to either sex elk
Open cow season one week/close it for spikes
Restrict to branch antlered bulls
Regulate access more to maintain quality hunting
Good whitetail hunting, moderate elk hunting
Elk and deer are not cows - shouldn't be hunted by sex
Too much timber cutting
Powerline has affected hunting negatively (3)
Lots of room for even more hunters
Only place I hunt (2)
Keep up the good work - love it
It was great
Extremely nice area - lots of game, fantastic area that it's easy to get game out of. Managed well.

DeBorgia:

Powerline has messed up the good hunting area
Powerline roads affect hunting quality (outfitter) (3)
Powerlines affect hunting, scenery, access (outfitter)
Good hunting as long as you know game roads, aminal habits - plenty of game
3 points or better on bull elk should be put into effect in this area
Less sign than in past years
More cow permits
Would answer questions differently for other areas, days
Too much clearcutting - doesn't improve game habitat unless old blow downs, brush cleared up - clear up old logging roads, cut brush away
Access for elderly/handicapped - day permits behind gates
Should be more gates open
Keep roads open for mountain bikes (2)
If horses are allowed, "under 40" motorized vehicles, too

Close areas to motorized vehicles and horses
Many motorcycles, three-wheelers, horses on roads
More signs to remind people to keep area clean

Haugan:

Game management good after kill of 1962 - less elk now
Too brushy to road hunt
Too much poaching
Season too long - too much pressure on bulls
Less out-of-state hunters; more cow tags to MT residents
Bow hunters should hunt with rest of us (2)
Two-week cow season instead of special permits (2)
Great country
Enjoys being in MT, hunting or not - a pleasure
Good roads
If less roads were gated, hunters will be less concentrated
Likes keeping access limited
Some gates should be open - they go nowhere, or the same distance as roads that have no gates
Against powerlines/roads/Forest Service
Undecided as to whether or not powerline has affected elk
Open closed powerline roads for firewood gathering
Powerline will have adverse effect on elk (2)
More check stations needed
Change location of check station
Treated coldly by DFWP when calling from PA for information - unable to answer his questions

Saltese:

Close hunting for 3-5 years or limit bull hunting to branch antlered - no spikes
Bow season has affected populations more than roads - should be required to demonstrate skills for bow
Thinks bull season only money racket for out-of-state hunters; they're killing off all the bulls
Open area to either sex elk until quota has been filled, similar to the Augusta area; forget the cow permits
Too many roads closed
Logging roads have hurt game numbers in places
Gates should be open for getting game out
Roads important here due to timber
Too many roads - close area to all vehicles - walking or horses only
Close roads to bow hunters, too
Powerline has hurt game numbers in places
Powerlines a nuisance
Powerlines keep you from getting lost, but they shouldn't be in this area
Powerline and new roads have reduced elk, esp. last 2 years
BPA almost criminal

Hunting pressure seems to be staying the same over the years
Taking too many bulls
Too much clearcutting

APPENDIX D

Results of the Cluster Analysis

RESULTS OF THE CLUSTER ANALYSIS

One of the baseline study's main goals was to estimate the distributive effects of the line: who would view its impacts as negative, who would view them as beneficial, and who probably wouldn't be affected.

It was hypothesized that hunters' reasons for choosing to hunt in the study areas would predict how the line would affect their hunting. People hunt for different reasons, some of which are more likely to be affected by the line.

The hunters were grouped according to how they rated the seven reasons for choosing to hunt in the study areas. Hunters with similar responses across the seven items were grouped together, forming a cluster or subgroup of people who had the same reasons for hunting in the area.

The Phase I Final Report used the BMDP k-means clustering procedure (Dixon 1983) to identify seven subgroups of hunters. It was hypothesized that three types of hunters would favor the effects (such as new access roads) or be unaffected, while three other types would view the changes negatively. Another subgroup would likely view the effects as severe.

We have already compared the 1983 and 1986 samples' mean responses to the seven clustering variables, finding few differences. The 1986 sample tended to rate as lower the importance of nature, meat, trophy, and having hunted there before. However, these differences were slight, and no difference was evident on hunting where there were few roads or getting away from other hunters.

When coupled with the results discussed earlier, this finding suggests that people chose to hunt in the study areas for the same reasons in 1983 and 1986. Therefore, a cluster analysis would be expected to identify similar subgroups of hunters based on these reasons. It is possible, though, that some types may have left the study areas, and a cluster analysis should detect this at a broad level.

The same seven questions on the 1986 survey were analyzed using the BMDP k-means procedure to compare the subgroup structures that emerged. When a cluster size of seven of seven was specified, however, a solution was not reached in 30 iterations, the maximum allowed in the program. BMDP recommends re-running the program using the seven cluster means identified as seeds. When this is done, the clustering starts with a good idea of the mean of each cluster on each variable to speed the procedure.

Unfortunately, the same thing happened, with failure to reach a solution after 30 iterations. The University of Idaho Statistical Consulting Center recommended re-running the program, but using the 1983 data as seeds. This has the advantage of directly testing the hypothesis with proven cluster centers (the 1983 analysis needed only 12 iterations). A disadvantage, however, was that starting with these centers would be more likely to reach a solution similar to that found in 1983--and thus support the null hypothesis of no impact.

The similarity in the raw data suggested that this would happen anyway, so the 1983 cluster centers were used as seeds for the 1986 analysis. When these centers were coded with one decimal point, 30 iterations again came and went with no solution; this may have been too specific. Rounding the averages to the nearest whole number, which should minimize these problems, resulted in a solution after 22 iterations, so that is the analysis reported here.

Table E-1 shows the cluster means on each of the seven variables. Comparison with Table 2 (page 30) in the baseline final report shows that quite similar clusters were identified in the two years. Hunters in each subgroup had the same patterns of responses as did the hunters interviewed in 1983.

As mentioned, the possibility of this outcome was increased by using the 1983 cluster centers as seeds for the 1986 analysis. Nonetheless, the similarity in the raw data for the cluster analyses suggests that the clusters would have come out close to this anyway.

The relative sizes of the clusters changed somewhat, but cluster size does not predict the proportion of that hunter type in the entire population. Cluster size is more a statistical artifact than a representation of population characteristics.

Table E-2 shows characteristics of the hunters in each subgroup--the same variables discussed in the 1983 cluster results. As expected based on the other analyses, the two years' clusters had much in common. Several differences were evident, but they did not appear to form any systematic pattern relevant to study hypotheses.

Replication of the clusters identified in 1983 supports the general conclusion that hunters are using the study areas for much the same reasons in 1986 as they were in 1983. One interpretation of these data is that the transmission line did not affect hunting opportunities in the study areas--but other interpretations are plausible and should be tested in the Phase III mail survey.

One alternative hypothesis is that people's ratings of the reasons for choosing the study areas aren't really area-specific, but are more generic--reasons why they hunt, not reasons why they hunt in a certain place. This hypothesis will be tested by looking at the Montana Bioeconomics Study, for which elk hunters visiting about 15 different hunting areas completed a similar (but longer) scale. By looking at the variation across hunting locations, we should be able to assess the actual role of area characteristics in shaping hunters' responses.

If little variation is evident, then such scales may be better measures of reasons for hunting than reasons for choosing a certain location. In other words, no differences would be expected between the 1983 and 1986 data unless the reasons why people hunt in general have changed, regardless of changes in the study area settings.

A second interpretation of no substantial differences between 1983 and 1986 clusters is that the study areas were defined broadly enough that even though the line was viewed as a radical change in the landscape, other portions of the study areas not adjacent the line continued to provide that same types of opportunities.

This was tested by comparing where within the study areas people hunted in 1983 and 1986; a shift toward or away from the line would indicate this type of impact. Comparing the two years' tables of where hunting use occurred on the grids for each study area, however, yields a confusing picture. It does not appear that changes were associated with the line. Rather, the large variation seems more random, because increases or decreases in use levels were evident in grids both along and away from the line.

As discussed in the Conclusion section, the best way to get right at the impacts is to ask questions about the line and its effects directly, the strategy to be followed in Phase III. By surveying the same hunters interviewed in 1986, we will be able to estimate the random yearly variation in hunter behavior, for both study area and non-study area hunters. When combined with specific questions about their behavior regarding the line, this should complete the picture of the line's effects on hunting opportunities.

TABLE E-1. Cluster Means on Seven Reasons for Hunting in the Area *

	Cluster Number:							
	One	Two	Three	Four	Five	Six	Seven	Grand Mean
Reason:								
Nature	2.3	2.7	1.9	2.1	1.8	1.8	1.7	2.0
Meat	2.3	2.6	1.8	2.3	1.6	2.7	2.2	2.2
Few Roads	3.9	3.9	2.7	2.6	2.7	2.2	1.8	2.8
Trophy	4.6	3.8	4.1	2.7	4.1	2.8	2.1	3.4
Here Before	3.9	2.7	4.7	2.2	2.2	4.6	1.8	3.0
Live Near	4.5	2.3	2.2	4.8	2.4	4.3	1.9	3.3
Few Other Hunters	4.2	3.5	2.0	2.2	1.9	1.9	2.0	2.5

* 1 = Extremely important, 2 = Very important, 3 = Moderately important, 4 = Slightly important, 5 = Not at all important.

Table E-2 Characteristics of the Seven Subgroups of Hunters

	CLUSTER:						
	One	Two	Three	Four	Five	Six	Seven
Variable:							
Percent who hunted one day or less on their trips	90	90	87	70	85	76	78
Percent who had hunted in the area 50 years or more	23	12	26	31	9	39	7
Percent who said this hunting area was their favorite or one of their favorites in MT	17	52	40	45	51	37	42
Percent who said the area has too many roads	14	15	18	21	30	33	35
Percent who said more gated roads should be opened	39	44	31	29	15	11	17
Percent who were Montana residents	93	94	95	74	98	74	95

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July 1989
250